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The organizational adaptation of universities to smart specialization: the emergence of strategic network interface units

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ABSTRACT

Universities are increasingly expected to engage in regional innovation policy. This has reinforced the need for organizational adaptation of university structures to respond to these new challenges. Recently, a variation in the typical knowledge transfer structures has emerged: strategic network interface units. These units are multidisciplinary and cluster-like formal networks led by universities in collaboration with businesses, government authorities and other organizations. This paper compares the organizational adaptation of two universities – the University of Aveiro and the Autonomous University of Barcelona – as they assume increased responsibilities in regional innovation dynamics. Through interview-based analysis, findings suggest these interface units were created to support the alignment of the universities with smart specialization strategies and EU priority areas for accessing funding. However, while the original aims of these units are very similar, their institutional and operational configuration has led to different cooperative arrangements. Transversal communication based on trust and capacity-building was an important supporting factor in the innovation impact of these units.

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1. Introduction

The contribution of universities to regional innovation is widely recognized. Their collaboration with multiple actors is considered to have a transformative role in activating regional knowledge dynamics, highlighting their role in the territory alongside industry and the state (Etzkowitz and Leydesdorff 2000; Gunasekara 2006). This is emphasized in academic concepts like Regional Innovation Systems and the Triple Helix model, and in new policy paradigms like smart specialization where universities are attributed a central role in regional innovation dynamics (Elena-Perez, Arregui Pabollet, and Marinelli 2017;

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Foray et al. 2012; Goddard, Kempton, and Vallance 2013; Kempton 2019). Universities are considered key agents in smart specialization strategies (RIS3) capable of guiding entrepreneurial discovery processes (EDP), matching industrial and research resources, and developing regional capabilities (Foray et al. 2012). However, expectations of the transformative role of smart specialization and universities are often exaggerated (Brown 2016; Hassink and Gong 2019; Kempton 2019; Sotarauta 2018).

Given increasing expectations, universities are adjusting through by creating closer inter-institutional ties and strategically framing their regional action. Viewed as the institutionalization of the «third mission» of regional engagement, complementing the traditional academic missions of teaching and research (Etzkowitz and Leydesdorff 2000; Zomer and Benneworth 2011), offices responsible for managing knowledge transfer and other collaborative activities have been created across universities to strengthen these outreach functions (Arbo and Benneworth 2007; Etzkowitz 2002). Recently, a new university organizational structure has emerged. Strategic network interface units have been created as multidisciplinary cluster-like networks between academics, businesses, government authorities and other organizations to align with regional policy priority areas. These structures remain relatively understudied as there are only a few European cases, although with others potentially emerging in adaptation to the current policy framework. This paper explores the organizational adaptation of two universities as they assume increased responsibilities in regional innovation dynamics, posing the questions: (a) what were the determinants that drove the creation and development of the new organizational structures; (b) how are these units linked to the universities' regional engagement strategy; and (c) what are the implications of these inter-institutional dynamics on the regional innovation (policy) landscape?

In accordance with the explorative character of the research, the grounded theory methodology of Gioia, Corley, and Hamilton (2013) is utilized through a comparative case-study analysis of the technological platforms (TPs) of the University of Aveiro, Portugal, and the strategic research communities (COREs) of the Autonomous University of Barcelona, Catalonia. The first section of this article reviews literature on universities' regional engagement and inter-institutional cooperation, smart specialization, and organizational adaptation, followed by the methodology, data utilized, and analysis of each case. A comparative reflection is provided in the discussion section, and theoretical contributions, policy implications and limitations are presented in the conclusion. Findings suggest universities are furthering regional innovation objectives through inter-institutional collaboration carried out in alignment with smart specialization, although the motivation is largely opportunistic.

2. Literature review

2.1. Universities and regional innovation

2.1.1. Academic ethos and regional engagement

The academic 'ethos' has changed significantly over time, shifting from knowledge dissemination (teaching) to knowledge production (research) in the first academic revolution in the nineteenth century (Etzkowitz 1990). With the second academic revolution, a third mission of external (regional) engagement has emerged (Etzkowitz 1990).

Universities are increasingly recognized by firms and government authorities as assets in innovation processes, resulting in their undertaking of further responsibilities towards society (Arbo and Benneworth 2007; Uyarra 2010). Accompanied by a need to acquire funding (Geuna and Muscio 2009), universities have thus assumed a heightened regional role through heterogeneous forms of engagement and organization.

Uyarra (2010) has conceptualized some of these forms, emphasizing, among other variables, the type of university and organizational unit that conducts the engagement, the main partners and the configuration of the dynamic. These engagement models range from a unidirectional knowledge transfer to more responsive and multilateral forms. The latter includes the entrepreneurial university model (Etzkowitz 1990; Etzkowitz et al. 2000) which focuses on universities' more generative role in economic development through knowledge commercialization (Gunasekara 2006; Uyarra 2010). In turn, the systemic university model refers to universities' 'boundary-spanning role' (Uyarra 2010, 1230) in networks, clusters and/or systems, particularly at a regional level. Lastly, the engaged university model is more developmental, with the university responding to regional stakeholders' needs and assuming broader governance responsibilities (Gunasekara 2006; Uyarra 2010).

All these models imply suitable organizational structures to manage the various facets of engagement. The entrepreneurial university model relies on organizational intermediaries like technology transfer offices or incubators. Likewise in the systemic university mode, although organizational linkages can also be formed through clusters and other similar bodies. The engaged university model relies on these and other structures including strategic and regional development offices (Fonseca 2019) and structures supporting staff regional outreach, regional decision-making and network brokering (Gunasekara 2006). Such engagement structures have spread across universities incorporating the «third mission», albeit with institutional and regional variation (Arbo and Benneworth 2007).

2.1.2. Inter-institutional collaboration for innovation

The previous arrangements were adaptive measures by universities to both internal and external pressures, aimed at facilitating the governance of knowledge transfer (Geuna and Muscio 2009), and thus universities' regional economic and innovation impacts (Alexander et al. 2018; Etzkowitz 2002). Closely associated, inter-institutional interaction and collaboration fosters capacity-building and learning dynamics linked with innovation outcomes (Guile and Fosstenløkken 2018; Morgan 1997). Pinto, Fernández-Esquinas, and Uyarra (2013, 3) have argued that SMEs interacting with external partners through knowledge mediators can overcome typical shortcomings in absorptive capacity, introducing '*innovations, invest*[ing] *in R&D and cooperat*[ing] *with the wider technological infrastructure*'. Given that informal collaborative arrangements are the most common form of engagement with universities (Pinto, Fernández-Esquinas, and Uyarra 2013), more dynamic and open engagement strategies could thus enhance these outcomes.

Inter-institutional collaboration through network-like arrangements has become a growing theme in the academic and political discourse (Fjeldstad et al. 2012). Conceptualizations of innovation dynamics through interactive models include the Regional Innovation System (Cooke 1992) and the Triple Helix Model (Etzkowitz and Leydesdorff 2000). Networked inter-institutional collaboration has also been favourably argued in

the context of innovation networks (Dhanaraj and Parkhe 2006), collaborative communities (Kolbjørnsrud 2017), ecosystems (Jacobides, Cennamo, and Gawer 2018) and technological platforms (Proskuryakova, Meissner, and Rudnik 2017). Inter-institutional collaboration can foster innovation by linking complementary actors and knowledge, thus creating a more effective learning and invention process (Dhanaraj and Parkhe 2006; Pinto, Fernández-Esquinas, and Uyarra 2013). Similarly, collaborative networks or communities can cultivate shared visions and commitment through 'trust, adaptability, innovation, knowledge creation and opportunity identification' (Kolbjørnsrud 2017, 141), crucial factors in the promotion of place-based leadership (Beer and Clower 2014).

However, potential challenges in network formation and stability include actor isolation, issues of leadership and autonomy, and network monopolization (Dhanaraj and Parkhe 2006; Kolbjørnsrud 2017). Therefore, when researching these arrangements, it is important to examine elements of governance, organizational structure, and stakeholder interaction. These are key in determining the network's effectiveness and potential, namely its mobilization, development, channelling and sustainability (Dhanaraj and Parkhe 2006; Kolbjørnsrud 2017; Nieminen 2005). While contextual changes, events and experimentation by the different parties involved can shape the emergence and development of these processes (Jacobides, Cennamo, and Gawer 2018), their success often relies on a 'triggering entity' (Dhanaraj and Parkhe 2006). As the main regional knowledge institutions, universities generally assume or are expected to play this orchestrating role. This is the case in the smart specialization framework, which emphasizes collaborative methodologies and views universities as key actors in regional innovation dynamics (Foray et al. 2012).

2.2. Universities in the context of smart specialization: policy pressure for adaptation?

The 2014 EU's Cohesion policy framework incorporated the concept of Smart Specialization, developed in 2008 by the expert group 'Knowledge for Growth' (Foray, David, and Hall 2009). The framework arguably 'revolutionised' innovation policy (Capello and Kroll 2016; Hassink and Gong 2019), through its place-based and strategic investment approach, in the suggested interconnection between related but varied domains (Richardson, Healey, and Morgan 2014), and in the promotion of collaborative and bottom-up methodologies through the EDP (Foray, David, and Hall 2011). It also required EU-wide adoption of the framework as an 'ex-ante' conditional access to European Regional Development Funds (ERDF), and emphasized universities' regional economic governance role (Elena-Perez, Arregui Pabollet, and Marinelli 2017; Fonseca and Salomaa 2020; Goddard, Kempton, and Vallance 2013). Universities are recognized within Smart Specialization as regional stakeholders especially capable og: (1) identifying and activating regional knowledge assets and priority investment areas; (2) building institutional and networking capability among regional stakeholders; (3) guiding and brokering governance processes (Fonseca 2019; Gunasekara 2006); (4) and matching industry, research and other regional assets to boost competitiveness and development (Fonseca and Salomaa 2020; Foray et al. 2012).

However, smart specialization and the contributory role of universities should be viewed sceptically. The policy framework is confusing, argued by some instead as 'smart diversification', as it intends for regions to identify priority areas through relatedness, branching and variety (Hassink and Gong 2019). The 'fuzzy' concept can thus make implementation difficult, especially for regional governments in peripheral and lagging regions that may lack the required capabilities (Capello and Kroll 2016; Hassink and Gong 2019; Pugh 2018). Moreover, there are other potential 'traps' in the integration of collaborative methodologies within smart specialization, including powerful actors monopolizing EDPs (e.g. universities or large businesses) and inter-institutional conflicts (Capello and Kroll 2016; Sotarauta 2018). This may lead to biases in priority identification, and to hindrances in implementation. Uncertainties exist, therefore, in how 'success' through RIS3 can be achieved as, despite hopes of smart specialization's transformative effect on regional innovation dynamics, it can still lead to lock-ins (Hassink and Gong 2019).

Similarly, universities may have an exaggerated relevance to regional innovation (Bonaccorsi 2016; Brown 2016; Kempton 2019). Just as their regional and institutional settings vary, so do their willingness and capacity to assume regional roles (Kempton 2019). Accompanying unrealistic expectations are risks of overdominance and overdependence on universities in these processes, as nexus in the innovation system (Brown 2016). Similarly, when university engagement is opportunistic, it can be withdrawn once assets (e.g. funding) are secured (Kempton 2019), jeopardizing sustainable commitment and policy alignment. Lastly, universities' role in regional economic governance is still relatively unexplored, with only a few isolated studies (Aranguren, Larrea, and Wilson 2012; Fonseca 2019; Fonseca and Salomaa 2020; Pugh et al. 2016; Rodrigues and Melo 2013). The institutional and organizational adaptation of universities to policy and regional expectations must be further explored.

2.3. Emerging organizational structures in universities' regional engagement: considerations of organizational adaptation

Organizational and institutionalism theories provide hypothesizes regarding how and when universities adapt their organizational structure. Path dependence theory argues that institutions take shape over time through self-reinforcing mechanisms (Prado and Trebilcock 2009). Deviating from these arrangements carries a cost, and alternatives are only explored when benefits outweigh this cost. Organizational change is therefore not easily encouraged. In neo-institutionalism, the environment and the institution's rules, norms and path-dependence constrain the willingness and capacity to adapt (Hladchenko, Dobbins, and Jungblut 2018). Windows of opportunity for fundamental changes can nonetheless be created (Hladchenko, Dobbins, and Jungblut 2018) through the intervention of governments and politics mediating universities' responsibilities toward society, together with funding, regulations and legitimacy (Trow 2007). Thus, a change in the regional policy framework can lead to a rethinking of the institution in its environmental context and to organizational adaptation. While Smart Specialization is reminiscent of cluster policy (Hassink and Gong 2019), its entrenchment and dissemination through the EU policy framework may have driven this opportunity window.

As the world shapes, limits and enables institutions' actions through rewards, pressure for conformity or shared values (D'Andrade 1984), sociological institutionalism posits endogenous processes can prompt organizational change. Scott (2013) argues change can ensue given the influence of regulative, normative, or cultural-cognitive systems within the institution. Therefore, the effective rules and directives of the institution, and the subconscious and socially-mediated routines of its actors, may shift the institutional mission, create new organizational structures or, at least, change the existing scheme's purpose.

Recently, organizational structures with a strategic regional focus and based on collaborative networked arrangements mirroring Smart Specialization precepts have been created in certain universities. These are formal multidisciplinary networks between academics, businesses, government authorities and other organizations, which adopt more dynamic, knowledge-based and complimentary configurations reminiscent of Uyarra's (2010) systemic model. Such organizations seek an alignment between research and engagement activities and regional priority areas, potentially enabling the attraction of ERDF funding and boosting regional stakeholder capabilities. These structures differ from clusters as they are not led by businesses nor have industry at their core (Rosenfeld 2002). Unlike traditional technological platforms, these interface units are not a policy instrument nor government directive (Proskuryakova, Meissner, and Rudnik 2017), although they follow a similar objective, i.e. the structuring of research in response to large scale challenges (European Commission 2004). Instead, they are university-led, with the university as the orchestrating entity or hub (Dhanaraj and Parkhe 2006; Jacobides, Cennamo, and Gawer 2018), providing a strategic orientation to multidisciplinary university research and engagement activities and organizing regional innovative dynamics through a networked arrangement between the university and other actors. Therefore, they are herein designated 'strategic network interface units'.

These units may result from internal processes or external pressures, but little is known about them. Concurrently, evidence of universities' institutional and organizational alignment to smart specialization is scarce (Fonseca and Salomaa 2020). As organizational structures potentially emerging from RIS3 alignment, an exploration of the regional dynamics they can generate, and their internal organizational and institutional implications is needed. This paper's conceptual framework employs an institutionalist logic to analyse these units. The aim is to understand the emergence of these structures and their embeddedness in the strategic framework of universities and their region, namely through the identification of path-dependencies in universities' organizational structure, windows of opportunity for change and other internal and external determinants. The following research questions are explored: (a) what were the determinants that drove the creation and development of these new organizational structures; (b) how are these units linked to the universities' regional engagement strategies; and (c) what are the implications of these inter-institutional dynamics on the regional innovation (policy) landscape?

3. Methodology

Considering its explorative and interpretative character, this paper follows an inductive qualitative research approach. A case-study methodology provides an intensive

examination of the selected setting, and is recommended towards answering causal research questions (Yin 2009). The comparative analysis of two cases (namely universities) in different regional and national settings seeks to identify similarities and differences between them, drawing out implications and patterns with the potential for generalization to theory (Yin 2009). This is particularly useful given this can be an expanding form of organization. Case-study selection applied the following criteria:

(a) Case studies should be universities that have created interface units with a multidisciplinary strategic cluster-like approach in the past 10 years;

(b) These units should have as primary territorial scale the engagement with the surrounding region, and in particular with diverse spheres of society (industry, government, civic organizations);
(c) Cases should be heterogeneous regarding their regional and institutional setting.

Thus, we focus on two universities – the University of Aveiro (Portugal) and the Autonomous University of Barcelona (Spain) – where strategic network interface units were established to structure academic research and engagement endeavours with the region (see Appendix 1 for university profiles, or rf. Fonseca (2019); Fonseca and Salomaa (2020); Manrique and Nguyen (2017)). The University of Aveiro (UA) has established technological platforms under the direction of its technology transfer office UATEC since 2015. The Autonomous University of Barcelona's (UAB) Vice-Rectory for Research started the CORE – strategic research communities – in 2013. Up until the design of this study, they were the only universities known to the authors to have created and developed this type of organizational structure.[1] In accordance with both criterion (a) and (b), these are recent endeavours aimed at coordinating a strategic approach to regional issues. UA's eight TPs focus on regionally relevant themes (Sea, Moulds & Plastics, Agro-Food, High-Pressure Multidisciplinary, Connected Communities/Smart Communities, Bicycle and Soft Mobility, Forest, and Habitat@UA); similarly, UAB's four CORE concentrate on EU themes (Smart Cities, Mental Health, Cultural Heritage and Education & Occupation) with a focused action in UAB's surrounding region. All interface units have partners from at least industry and regional government. As per criterion (c), the case-studies are in geographically and economically heterogeneous regions. UA is in the less-developed sub-region of Aveiro, in Portugal's coastal area and between the major cities of Lisbon and Porto. Its economy is mostly reliant on SMEs, and agriculture is still predominant. UAB benefits from the more developed, highly innovative, and densely populated metropolitan area of Barcelona. Surrounding it are major transport links and one of the most industrially relevant areas in the country. This heterogeneity provides a fertile comparative ground.

This paper draws on 21 (11 for UA and 10 for UAB) semi-structured interviews conducted between Spring 2017 and January 2019 (see interview overview in Appendix 2). Interviewees included academics, support staff and external partners connected to these platforms (companies, industrial and civic associations, local and regional government) (see interviewees' profile in Appendix 3). Questions were designed to understand each university's engagement with smart specialization, their organizational adaptation and alignment with the strategy, the role of the units in framing university activities, and the impact

Table 1. Overview inspired by Germain-Alamartine and Moghadam-Saman (2019) of the application of the methodology developed in Gioia, Corley, and Hamilton (2013).

	1st-order analysis	2nd-order analysis	3rd-order analysis
Aim	Coding from informants' discourses	Thematic categorization of 1st order codes	Grouping 2nd order themes into aggregate dimensions
Iterations	3	2	2
Final number of:	Nodes	Themes	Aggregate dimensions
For UA case	156	18	7
For UAB case	128	21	7

on regional innovation. The aim was to investigate the extent to which these initiatives operate to match the priority areas of each region's RIS3, and the nature and focus of their activities. Interview guides generally followed the structure in Appendix 4.

The grounded theory methodology utilized was developed by Gioia, Corley, and Hamilton (2013) and designed specifically for exploratory studies. Its proponents (see Glaser and Strauss 1967) suggest it as a systematic methodology enabling theory and concept construction based on informants' discourses and not 'a priori' codes from the literature, minimizing researcher bias. After a three-step analysis and coding process through the qualitative and data analysis software WebQDA and Microsoft Excel (Table 1; see also Appendix 5 for 3rd-order analysis categorization), charts were designed for illustration and procedural comparison (Figures 1–3).

4. Findings

This section highlights the characteristics and thematic configuration of each institution for an in-depth comparative analysis of their underlying similarities and heterogeneity.

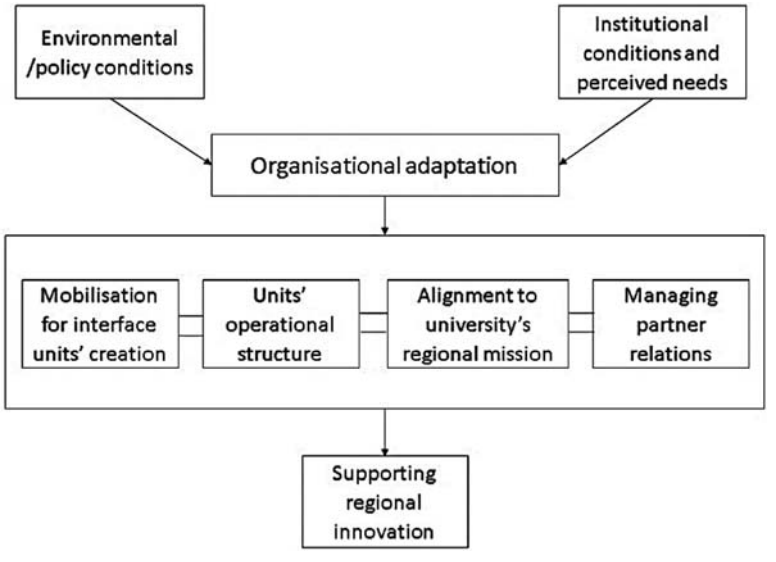

Figure 1. Analytical model of the process of organizational adaptation and creation of interface units for regional innovation support.

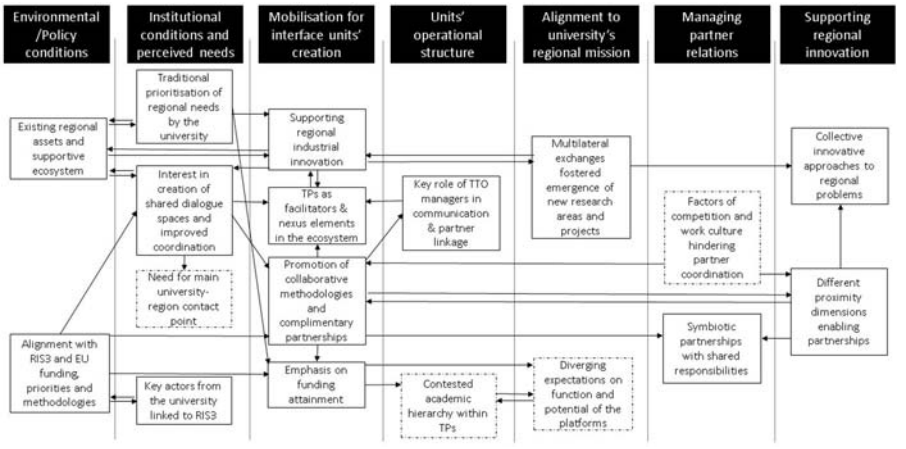

Figure 2. Details into the process of creation, management and impact of the University of Aveiro's technological platforms (TPs).

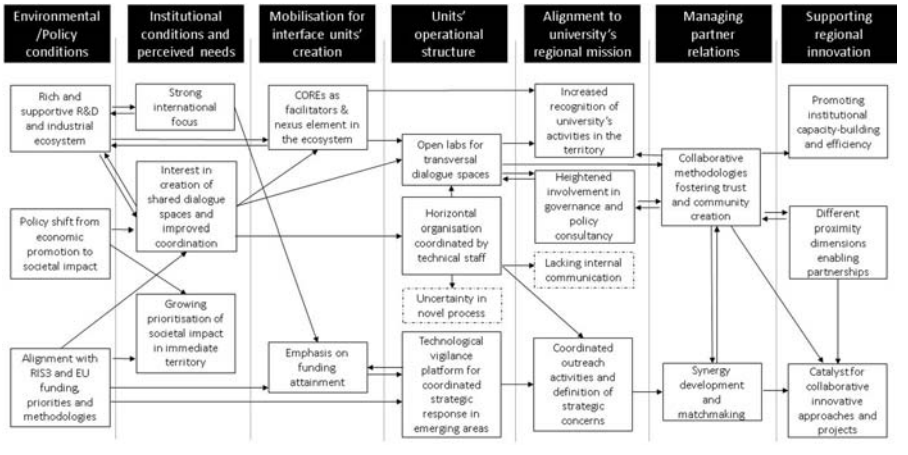

Figure 3. Details into the process of creation, management and impact of the Autonomous University of Barcelona's strategic research communities (COREs).

4.1. Analogous processes

Despite the heterogeneous geographical and institutional contexts, both cases shared a similar process of creation of their respective interface units. Aggregate dimensions were identical in both models, considering internal and external motivators for organizational adaptation, and the sequential order in establishing, organizing and developing the unit within their wider university and regional contexts (see analytical model in Figure 1). The internal process of emergence of the new structure is represented by the 'mobilisation for the interface unit's creation', the 'units' operational structure', the perceived 'alignment to university's regional mission' and 'managing partner relations'. The output is the impact of this adaptation and the internal dynamics on the surrounding territory. As the case models show, phases are interlinked in a self-reinforcing process.

For example, when universities' interest lies in regional engagement, collaborative institutional structures likely figure in their strategic plans. However, when a policy highlights strategic areas, like RIS3, this can lead universities to coordinate internal efforts in these collaborative structures, to link to those regional priorities. This follows Hladchenko, Dobbins, and Jungbluts (2018) idea of a political window of opportunity that can enable institutional and organizational changes.

4.2. University of Aveiro (UA)

4.2.1. Conditions for organizational change: environment, policy and institutional context

The regional environmental, policy and economic context was consistently highlighted by interviewees. These contextual conditions were enabling and supportive elements of the innovation ecosystem, and crucial determinants influencing UA's regional engagement mission. Interviewees referred to the existing UA-region tie and early linking to areas of regional industrial relevance. Similarly, respondents pointed to existing regional assets – e.g. infrastructure, specialized human capital, and key developing areas – that led to UA creating collaborative channels:

> We have this ecosystem where we have the users, we have the economy and we have the research that is interested in learning and making something with them. (Interviewee A)

Concerning the policy context, alignment to EU priorities emerged as influencing the university's mode of regional engagement and the decision to create the interface units. Particularly the regional RIS3 (RIS3Centro) priority domains and clusters, such as agro-food, sea and sustainable solutions (like the Habitat cluster) (CCDRC 2014). By participating actively in the EDP and RIS3 working groups, UA was uniquely positioned to shape RIS3 priorities. UA actors' involvement in strategy design and other major regional structures (e.g. clusters) led to a greater promotion of this alignment. Notably, interviewees mentioned the opposite also occurred, with RIS3 providing greater awareness of regional assets: 'With the smart specialisation now (…) we have more availability over the actors and knowledge and skills.' (Interviewee H). This intentional alignment facilitated UA's (and its partners) access to regional funding, further cementing inter-institutional collaboration.

Certain factors of UA's institutional context were also underlined as enabling conditions. Regional engagement was perceived by staff and outside partners as UA's vocation and responsibility, leading UA to promote dialogue with the region. This emerged from a certain institutional path-dependence, leading to multiple region-UA contact channels. According to interviewees, the emergence of certain opportunities, namely those associated with RIS3, led UA to streamline collaboration with the region by improving its internal coordination and response to strategic concerns through one main body.

4.2.2. Creation, mobilization and operation

The abovementioned conditions led to the creation of UA's TPs. These units were initially devised in early 2000s by the vice-rector for University-Society Relations, who

sought to promote university strength areas and establish and/or consolidate contact with major regional players to stimulate collaborative research. This idea developed in 2015–2016, when the TPs were officially created. Their current aim is to support regional industrial innovation through multilateral cooperation with diverse regional partners in relevant areas, namely within RIS3. Interviewees emphasized funding generation as a motivator for academic engagement. Despite its more material goals, the TPs have a component of inter-institutional support and capacity-building.

Interviewees argued the improvement of internal and external communication was needed to increase asset awareness. Emerging collaborative methodologies, like EDPs, design-thinking, etc., integrated within a strategic and multidisciplinary structure like the TPs, were believed to stimulate dialogue and complementary partnerships:

> It was not to sell our knowledge. (…) But it was to create a space where we could dialogue, where we could make things together and we could start to put them in practice. (Interviewee A)

Despite the overarching collaborative objective, the TPs organization reflects an academic hierarchy that, according to interviewees, can hinder participation and cooperative dynamics. UA's platforms are composed of: coordinators, i.e. recognised academics in the area, often belonging to different departments to foster TPs' multidisciplinary character; and collaborators, i.e. other academics and external partners that have decided to participate in the network. TPs also have an assigned manager within UATEC, responsible for communication with external partners. A proposal usually arrives through UATEC's TP manager, who then contacts the platform coordinators. The coordinators should then distribute projects across their collaborators, but interviewees stated a tendency to amass projects, leaving other academics with little involvement and financial benefits. Aside from this contested hierarchy, TPs' operation managers were unanimously considered key contributors in enabling efficient and long-term productive network relations.

4.2.3. Alignment to UA's regional engagement

Considering their incorporation in UA's regional engagement mission and in the institution overall, most academic collaborators have engaged through the platforms with both private and public actors in a dynamic and multilateral way, leading to new partnerships and joint projects. This has manifested itself in UA supporting industrial innovation and in other benefits to the university such as companies engaging through the platforms which has stimulated new research areas within UA, reinforcing mutual exchanges:

> *(…) We started to work with them* [UA]. *We brought them to the project (…). Because before they were not working at all with this* [theme]. *So we* [company name] *gave a new theme for the University of Aveiro to work on.* (Interviewee I)

Nonetheless, opinions diverge regarding the platforms' utility. Interviewee E argued that expectations should be mitigated, and that platforms should be simply considered as flexible service-provision 'tools' to form networks and facilitate access to regional funding. The ambition of some academics to make TPs a nexus of the innovative

ecosystem and dynamic spaces for collaborative activities clashes with this view. TPs have nevertheless become one of the main linking points for UA-region engagement in the areas tackled.

4.2.4. Regional dynamics: managing partner relations and supporting regional innovation

Other dimensions emerging from TP operationalization and regional interaction relate to partner relations and ecosystem impact. Interviewees believed partner relations to be occasionally conflicting. Both companies and government authorities were believed to perceive UA as a competitor in the region, whether for R&D assets and potential funding, or in terms of UA's strong image in territorial governance: 'They don't want to meet us because they want to make their own planning, their own projects, and proposals' (Interviewee A).

Work culture, namely partners seeing academia as 'slow', factors into this perception. Interviewees underlined the need to build trust between partners. Platforms thus attempted to build commitment through symbiotic relationships between partners, where each one had their own role and responsibilities in shared projects:

> If the leadership of the company is not in tune with the project it doesn't matter if it's small or large, the project will not work. This is the most determinant factor, if there is a commitment from the management of the company to the innovation process. (Interviewee B)

Dimensions of proximity also played a role in the platforms' formation and activities. Besides the relational proximity noted between university actors and RIS3, interviewees mentioned the importance of geographical proximity, common values and objectives, and joint varied activities. With this implanted, addressing regional problems in a collective innovative manner was possible given the multidisciplinary and multilateral partnerships in these strategic sectors.

4.3. Autonomous University of Barcelona (UAB)

4.3.1. Conditions for organizational change: environment, policy and institutional context

Interviewees highlighted the advantageous economic and innovation-related regional conditions. Proximity to Barcelona and the industrial and research infrastructure surrounding UAB enabled closer relationships. The entrepreneurial ecosystem is believed to provide ideal conditions for collaborative innovative dynamics, warranting a strategic territorial lens on UAB's engagement:

> Behind each CORE, there are strategic objectives, strategic in the sense that they are territorial, regional, in the context in which the university is situated. (Interviewee L)

The policy environment was also emphasized. A national and regional policy shift was referred to including both overall knowledge promotion and transfer and the generation of knowledge oriented towards addressing societal challenges. This follows international and EU action lines associated with Sustainable Development Goals and societal impact. These shifts and priorities at multiple levels were considered influencing factors for UAB's organizational adaptation. Although UAB had less engagement in RIS3 design,

int eh context of the highly competitive regional environment, interviewees justified the creation of UAB's CORE by a desired alignment with EU and RIS3 priorities and methodologies for funding access:

> Why these themes? Because they are European themes. Some of these themes that the university already has institutes that cover them, but there are other themes that the EU is financing that the university didn't have. (Interviewee N)

Regarding UAB's institutional context and potential determinants for the units' creation, the proximity to the innovative metropolis of Barcelona provided an important international orientation, but path-dependent prioritization relation with the territory suggests 'impact should be in your first immediacy area' (Interviewee P). This has recently grown in importance with an approximation to the campus' surroundings through a campus network (UAB-CIE). Mechanisms for this UAB-region relation have therefore been progressively promoted. A perceived need for a closer connection with the territory and for effective internal coordination led to the COREs' creation.

4.3.2. Creation, mobilization and operation

Created in 2013, the COREs were devised in the Vice-rectory for Research in conjunction with its Strategic Development Unit. The aim was to optimize the network of institutions established with the UAB-CIE sphere, 'to search constructive relationships with the agents of the territory' (Interviewee O) and help launch economically relevant projects. They were also viewed as internal coordinators of UAB's research assets, efficiently reorienting them towards regional needs. Similarly, funding was considered a key aim: a 'way that our research teams can get finance' (Interviewee N). The COREs were thus proposed as connecting bodies within the territory and a distinguishing synchronizing feature to facilitate funding access.

Each CORE has a manager within the Strategic Development Unit of the Vice-Rectory for Research. This manager coordinates the CORE network and represents the academic community in their respective strategic theme. While previously an academic within that area, as CORE manager they do not conduct research which helps to mitigate hierarchical bias. The CORE structure is therefore more 'horizontal' academically. Their operation is also multidisciplinary in scope and encompasses as partners or collaborators, first, the UAB academic community and, in a later phase, other regional actors from the public and private sectors. Any partner can initiate projects but they are usually coordinated by the manager, who assigns/searches for relevant academic partners.

Based on this central structure, the COREs have been developing other spaces to promote dialogue across the units, the academic community and the region. Including, UAB Open Labs, and other labs across the region on municipalities' invitation, designed to nurture innovation and closer links. A Technological Vigilance Platform is also being developed in association with the COREs to identify emerging economic areas and quicken UAB's strategic response. As one interviewee highlighted, COREs are introducing novel ways of working:

> The COREs weren't created in the traditional way of creating a new body or entity within the university, like a cathedra, or a new centre. They weren't made with a clear regulation. They let it be more open, more dynamic, to find a more flexible way to insert ourselves within the

> structure of UAB that will allow us to do several things that otherwise wouldn't be possible. (Interviewee L)

This novel methodology and process, however, was considered one of the impediments to the COREs' operationalization, as interviewees identified that few within UAB knew this way of working. This suggests challenges in disseminating new methodologies in a rigid institutional context. For this reason, when a CORE is created, it focuses on the internal university community first before proceeding to external engagement.

4.3.3. Alignment to UAB's regional engagement

Despite initial uncertainty, according to interviewees, the COREs are now a UAB regional branding tool. There is increased recognition of UAB actors and strategic knowledge assets and infrastructure, leading to more connections and proposals from the territory. One type of engagement UAB has been more involved in is policy consultancy and other associated governance activities. The COREs have prioritized linkages with local administration, leading to several proposals and joint initiatives with municipalities. The Smart Cities CORE has been involved in a RIS3 project with the municipality of Sabadell called 'Vallès Industrial' (€1.5 million in ERDF), and the Cultural Heritage CORE in the Library Living Lab of Volpelleres in the municipality of Sant Cugat del Vallès.

The COREs are believed to have contributed to UAB's research and knowledge asset coordination, and external engagement activities. An interviewee remarked: 'when I go to the territory, I tell a CORE' (Interviewee O). Interviewees also highlighted that previously knowledge transfer was not a central focus in UAB but is now growing in importance. However, they noted a lack of effective dissemination of the initiatives and the results achieved through the COREs, difficult because of the small coordinating team. Interviewees argued this should be improved to further internal cohesiveness and the COREs' regional presence.

4.3.4. Regional dynamics: managing partner relations and supporting regional innovation

Interviewees frequently referred aspects of partner relations and their connection to regional innovation support, namely COREs' potential to find synergies between actors of complimentary sectors, or matchmake across various disciplines. An interviewee stated: 'you have to get good matches, for instance, between people of different specialties and trainings' (Interviewee R) to achieve an innovative perspective on an issue. Consequently, by appealing to different interests, encouraging collaborators is easier: 'to convince them to participate, you have to think of how this is advantageous to all the participating actors' (Interviewee L).

Related is the importance of collaborative methodologies for nurturing trusting relationships within the COREs. Open and cross-sectoral innovation, co-creation and co-ideation were terms utilized to signify this new working mode introduced through the COREs, which as one interviewee noted are 'not the traditional transfer methodologies' (Interviewee N). In conjunction with other dimensions of proximity at play in the COREs' work, this strengthens regional connections through this network.

Finally, at a regional level, COREs are seen as potential catalysts for partnerships and projects. While financial and other material benefits are highlighted regarding their activity, other intangible advantages emerged in interviews. Specifically, these units are believed to promote efficiency and capacity-building among regional actors and institutions. One example is their relationship with municipalities for the open labs project, where COREs provided innovation support that local government lacked.

5. Discussion

This section provides comparative case study insights considering the research questions.

5.1. What were the determinants that drove the creation and development of the new organizational structures?

In both cases, interviewees acknowledged that an institutional path-dependence toward regional engagement was present in these universities which, combined with the policy landscape – window of opportunity – enabled a shift in the organization (Hladchenko, Dobbins, and Jungblut 2018; Prado and Trebilcock 2009). In both cases a supportive ecosystem, accompanied by a deliberate alignment to RIS3 strategic priorities and EU funding was prominent, highlighting potential institutional benefits. In UAB this also included a focus on societal impact. As entrepreneurial universities with strong regional ties, the path-dependency of their practices and identity was noticeable (Krücken 2003), as they were willing to create engagement structures and shared similar objectives: strengthening regional ties and multilateral communication through collaborative methodologies, becoming a supportive nexus for the innovation ecosystem, and attracting funding. UA had a particularly proactive and opportunistic stance by engaging directly in RIS3 design (Fonseca and Salomaa 2020), thus playing a role in priority definition and facilitating internal coordination and inter-institutional cooperation for funding access. However, both institutions went through a cumbersome process in the creation of these structures, having to circumvent existing organizational complexities (e.g. streamlining university-region contact, UA), and clashing institutional orientations (internationalization, UAB). There is, nonetheless, validity in the argument that universities are shaping their directionality and selectivity according to the precepts, priorities and procedures of RIS3, and in considering that this functionality and opportunism constrain the academic 'ethos'.

5.2. How are these units linked to the universities' regional engagement strategy?

5.2.1. Influence of the interface units' configuration

The interface units analysed had similar objectives, but were operationalized in differing ways, reflecting their institutions' context, organizational dynamics, and overall regional engagement approach. In UA's case, even though the university has committed itself to several regional partnerships and touted the integration of an engagement mission, this meant difficulties in its formalization, diffusion and legitimacy in the academic

community (Fonseca 2019). Despite UA's more horizontal structure – without the intermediary of faculties – its TPs reproduce a traditional hierarchy, with academic coordinators monopolizing initiatives, which represents a network risk (Dhanaraj and Parkhe 2006; Kolbjørnsrud 2017). In turn, even though UAB's COREs have emerged as a top-down directive, they attempt a horizontal and bottom-up approach in network management. This may relate to the recognized need to enhance UAB's internal communication, given its more fragmented, faculty-based structure. A horizontal structure enabled by bodies that lead inclusive integration may be suitable in this context to activate collaboration.

The schematic visualization of interviewees' discourse (Figures 2 and 3) shows what these work modes and operationalization entail and how they may be impacting internal coordination and external engagement. Within UA, TPs' contested hierarchy is mitigated by the harmonizing influence of UATEC's TP managers who ensure communication flow and encourage frequent collective initiatives (e.g. workshops). However, while new methodologies have cemented the networks in certain TPs, some perceive them as another 'tool' for traditional forms of technology transfer. Accordingly, there can either be an exaggeration in accounts, or a lack of legitimacy of new work modes and a 'layered' 'modus operandi', as these coexist with traditional ones (Hladchenko, Dobbins, and Jungblut 2018).

Within UAB, there are developing initiatives to enhance the COREs' transversality, with the most prominent mechanism being the UAB Open Labs. These structures have furthered UAB's territorial outreach through collaborative methodologies. The gradual introduction of these mechanisms allowed adjustments based on results. Interviews suggest UAB also emphasizes COREs as learning vehicles. Conventional engagement methodologies are still prevalent, but UAB has succeeded in embedding new work modes by, like UA, 'layering' them over old ones (Hladchenko, Dobbins, and Jungblut 2018).

5.3. What are the implications of these inter-institutional dynamics on the regional innovation (policy) landscape?

5.3.1. Effective and potential regional impact

Interface units in both cases followed a similar regional approach. Units have been seeking to support the innovation ecosystem by providing R&D resources and linking existing actors and assets through leveraging different proximity aspects (Boschma 2005). This has enabled a more efficient approach to regional issues, given that resources are shared and matched for complementarity (Dhanaraj and Parkhe 2006; Pinto, Fernández-Esquinas, and Uyarra 2013). Achieving synergies and efficiency were distinguishing goals in UAB's case. For UA, sharing responsibilities and getting potential partners' interest through mutually advantageous partnerships were emphasized. Nonetheless, COREs appear aware of the benefits of working in these networks, a likely consequence of being their initiators. While UA is known for building regional institutional capacity (Fonseca 2019), this was not alluded to explicitly as a goal or benefit of its TPs; whereas that was clear in UAB's COREs. The consideration of more inclusive modes of collaboration suggests intangible benefits are a desired outcome for these units. Discussion of community and trust-building strengthen this argument, and support the greater

benefits of collaborative networks, i.e. capacity-building and shared visions (Kolbjørnsrud 2017).

Consequently, this suggests these units are attempting to emerge as 'ecosystem connectors', i.e. enabling, encouraging and optimizing collective knowledge exchange to boost innovative capacity, and building relational and individual institutional capacities for the development of the entrepreneurial ecosystem. The question remains whether this is uniform across all units, or only in certain cooperation areas. Furthermore, it is still uncertain whether these units can be sustainable, and cement organizational change or a transformative regional effect. Stakeholder interaction and management is positive, and funding access is a shared and motivating goal, pointing to network sustainability (Dhanaraj and Parkhe 2006; Kolbjørnsrud 2017; Nieminen 2005). However, given issues in organizational structure and legitimacy, particularly in UA's case, actor isolation and network monopoly risk the units' longevity and institutional integration (Dhanaraj and Parkhe 2006; Kolbjørnsrud 2017).

5.3.2. Risks and opportunities of (mis)alignment with S3

By focusing investment and assets on strategic areas, these interface units are following the principles of smart specialization. In both cases, their creation was inextricably linked to the opportunity window presented by EU priorities and RIS3. This was both indirect, by pushing for greater internal university coordination for facilitated funding access; and direct through targeted convergence with certain RIS3 clusters or priority dimensions resulting in a similar focus within the universities. Examples of the latter include: the Habitat cluster consistently highlighted in RIS3Centro and reflected in the TP Habitat@UA; and UAB's Cultural Heritage CORE, which follows RIS3CAT's Cultural and Experience-based Industries leading sector (Generalitat de Catalunya 2014).

This alignment has enabled complementarity and activation of regional resources, with universities helping to match RIS3 discourse to regional needs. Furthermore, they have promoted awareness of the innovation policy and supported its implementation (Fonseca and Salomaa 2020). Despite uncertainties regarding the smart specialization framework and implementation, these collaborative networks have demonstrated potential in balancing RIS3 mobilization and inter-institutional conflict traps (Capello and Kroll 2016; Sotarauta 2018). It is nonetheless important to question motivations and risks. Overreliance on universities to solve such traps should be avoided to avoid network monopolization. Similarly, while the strategic and specialized/diversified outlook on the part of the universities may be useful for stimulating certain sectors, it is important to consider risks of lock-in. In addition, in both cases, funding access emerged as these units' reasoning, highlighting an opportunistic logic that may dispute long-term commitment (Kempton 2019). In some cases, the RIS3 connection was unclear, like in UA's TPs on biking or high pressure. In others, this funding search went beyond RIS3 alignment towards Horizon 2020 and other schemes, even when area-specific resources were lacking in the university and region (more evident in UAB). Given that UA was actively involved in RIS3 priority identification, the risk of overdominance of the university exists alongside opportunism, with regional needs as secondary. Policymakers should notice that, although these units can stimulate existing or emergent areas and inter-institutional collaboration, the effective impact may be lessened due to typical academic constraints, i.e. funding. Intagible benefits can thus

be advocated to ensure attention goes beyond immediate financial concerns to more sustainable advantages, like capacity-building.

6. Conclusion

This study contributes to literature on regional innovation systems, organizational adaptation and universities' engagement, while adding to the debate on regional innovation policy. It explores the emergence and contribution of universities' organizational structures – strategic network interface units – for network engagement. To our knowledge, this is the first study in the literature exploring the operationalization of these structures and their potential role in the regional innovation ecosystem.

Answering the research questions, the creation and development of these structures was motivated by an institutional path-dependence, or pre-disposition toward regional strategic cooperation. Moreover, an opportunity window in the policy environment enabled linking universities more closely to the policy sphere, with funding attraction as a primary objective. The units were generally well integrated in their universities' regional engagement strategy, though with UA following a traditional academic hierarchy and UAB a more horizontal approach. These units' wider acceptance and legitimacy was hindered in UA's case. Regarding their regional implications, they have motivated inter-institutional collaboration, capacity-building, new cooperative methodologies and innovations. While this could suggest network sustainability, their impact remains minimal. Moreover, alignment with the current policy framework may lead to lock-ins, linking them inextricably to mere temporary funding and themes.

Findings carry theoretical and practical implications for universities and policy-makers. First, these units' creation was heavily influenced by the regional innovation and smart specialization discourse and by broader European debates on societal challenges and associated funding opportunities. Therefore, opportunity for similar linkages in other contexts remains, although awareness of the framework's shortcomings is advised. Second, while universities embrace a wide and varied scope of academic fields, focusing resources and branding on regional priority areas can encourage engagement activities and innovation-related territorial impact. This is heightened when these synergies are stimulated through cross-cutting communication. Lastly, inclusion of collaborative methodologies in regional engagement repertoires can further relational and cognitive proximity, acting as a mechanism for community and institutional capacity-building.

By exploring these structures, the authors anticipate a broader consideration of universities' roles in regional development and greater openness to explore different forms of collaborative work to further innovation efforts. Regarding limitations, the study only examines two early instances of this form of organization, focusing on generalization to theory to better understand such structures. There is potential for these becoming more widespread, especially in large research-intensive universities trying to align with regional innovation policy. Nevertheless, these units were created recently and it is early to assess the full extent of their impact on the territories' research and innovation landscape (e.g. funding gained, key areas), even though they are building the appropriate foundations for inter-institutional collaboration. Further study can thus contribute to these points.

Note

1. The authors were informed in January 2020 that the University of Girona, in Catalonia, has recently started implementing their very own strategic network interface units under their Sectorial Campus Programme. This was promoted through a local government-led RIS3 instrument. For more information, see: www.udg.edu/ca/campusempresa/campus-sectorial

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Appendices

Appendix 1: University profiles

Name Link	Universidade de Aveiro (UA) www.ua.pt	Universitat Autònoma de Barcelona (UAB) www.uab.cat
Creation	1973	1968
Students	13 675 (2018)	43 175 (2018)
Strategic Foci	• Teaching, research & cooperation with society; • Entrepreneurialism; • Innovation; • Regional development.	• Innovation; • Internationalization; • Social responsibility; • Knowledge transfer.
Engagement Support Structure	• Pro Rector for Regional Development; • Vice-Rector for University-Society Relations; • Technology Transfer Office (UATEC) (+ TPs); • University-Business Office (GUE); • Research Park; • Business Incubator (IERA).	• Research park; • Vice-manager's office for Research (+ COREs); • Hub B30; • Vice-rector for Innovation and Strategic Projects; • Vice-rector for Research and Transference.
Education foci	Materials, Biosciences, Engineering, Planning and Governance	Health Sciences, Economy, Biosciences, Social Sciences and Law
Further relevant education institutions	4 other Polytechnic Schools that are a part of UA (Design, Health, Management, Accountancy).	• 11 other higher education institutions (detailed list in Generalitat de Catalunya, 2016)

Appendix 2: Interview overview

	UA	UAB
Min-max length of interviews	00:42 – 02:14:37	00:20 – 1:24:19
Number of interviews	11	10
Platform staff	5	3
Other university staff	1	5
Public organizations	3	2
Private organizations	2	-

Appendix 3: Inteviewee profiles

Case	Interviewee code	Type of organization	Field of activity of organization
UA	A	Technological Platform	Mobility
UA	B	Technological Platform	Sustainable Housing
UA	C	Technological Platform	Sea
UA	D	Technological Platform	Agro-Food
UA	E	Rectory team	Knowledge transfer
UA	F	Rectory team	Knowledge transfer
UA	G	Tech. Plat. Partner	Mobility
UA	H	Tech. Plat. Partner	ICT
UA	I	Tech. Plat. Partner	Sea
UA	J	Tech. Plat. Partner	Sea
UA	K	Regional government	Innovation & Development Policy
UAB	L	CORE	Smart City
UAB	M	CORE	Education & Occupation
UAB	N	CORE	Heritage
UAB	O	Rectory team & Intermediary	Uni.-Region Engagement
UAB	P	Rectory team	Knowledge transfer
UAB	Q	CORE partner	Smart City
UAB	R	Intermediary	Knowledge transfer
UAB	S	Rectory team	Strategic projects
UAB	T	CORE academic partner	Education & Occupation
UAB	U	CORE academic partner	Smart City

Appendix 4: General interview guide

(1) Profiling of the interviewee
   a. Position and institutional affiliation;
   b. Link with university;
   c. Link with interface unit;
(2) University profile
   a. University missions and engagement orientation;
   b. University-region engagement;
   c. University engagement through the interface unit;
(3) Creation, organization and governance of the interface unit
   a. Motives and conditions for creation and strategic lens;
   b. Links with multilevel industrial and innovation policy;
   c. Internal organizational structure;
   d. Interactive structure and dynamics with internal and external partners;
(4) Potential shifts, tensions and impacts
   a. Changes emerging with the creation and development of the interface units;
   b. Operational, institutional and interorganizational challenges;
   c. Existent and foreseen university impacts;
   d. Existent and foreseen regional innovation impacts.

Appendix 5: structuring of second order themes into aggregate dimensions